
Rachel Carson Syndrome: Pesticides, Frogs, and Organic Foods

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Carson's Legacy: Pesticides are Suspect #1

- Carson's claims of DDT's impact on birds in *Silent Spring* (1962) launched modern environmental movement via
- DDT used as farm insecticide starting in 1944 and through the 1960s. (replaced expensive and highly toxic botanicals such as nicotine sulfate)
- Peak year of use, 1958, 80 million lbs. applied.
- 1.35 billion lbs applied in U.S. total



Rachel Carson's Bias



- Claimed that Silent Spring was launched after letter from friend about bird poisonings in 1958.
- But personal papers at Yale show deep distrust of DDT from start. She wrote an anti-DDT letter to Readers Digest in 1945!
- Ideological before she was “scientific.”

Carson's Scientific Integrity

- Carson originally had a co-author for *Silent Spring*, Edwin Diamond, science editor of Newsweek.
- He backed out soon after they started collaborating, eventually calling her work an “emotional, alarmist book seeking to cause Americans to mistakenly believe their world is being poisoned.” (Sat. Evening Post, Sept. 28, 1963)



Does DDT Thin Eggshells?

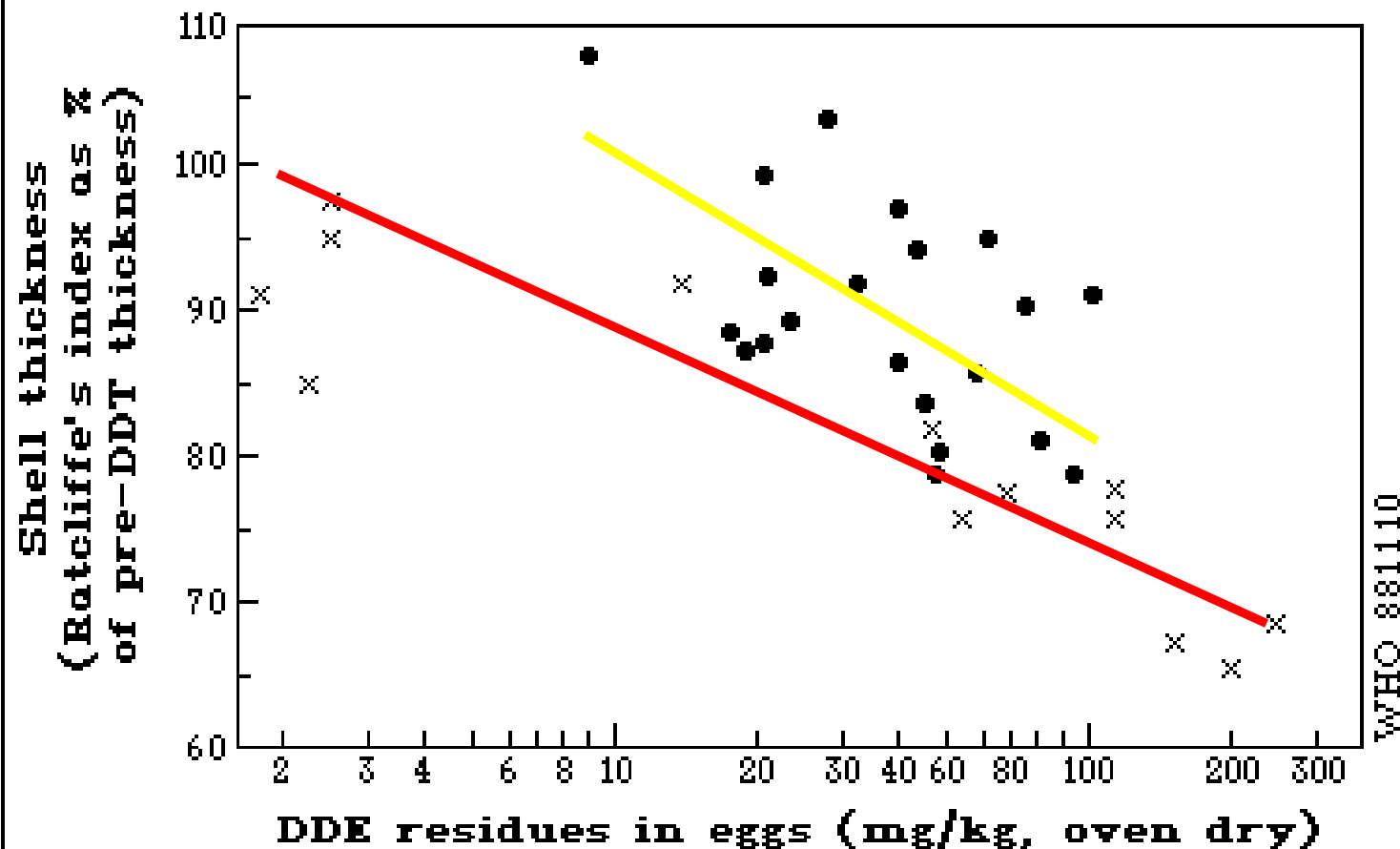
- Carson claimed that DDT thinned raptor bird eggshells, based on studies of Dr. James DeWitt, USFWS.
- DeWitt found that in quail 84% of control eggs hatched vs. 75-80% of DDT-fed birds. (J. of Ag and Food Chem. 1956)
- With pheasants, 57.4% of controls hatched vs. 80.6% of DDT-fed birds.
- 8 week survival was 89.7% control vs. 93.3% DDT-treated pheasants.
- **What about Raptor birds, brown pelicans?!**



DDE Thins Shells in Some Birds

- Studies with ducks, peregrine falcons, and barn owls show shell thinning (5-20%).
- Dose response in lab similar to wild studies.
- Impact on hatching and population unknown, however.





WHO 881110

Relationship between mean clutch shell thickness and DDE residue of American kestrel eggs collected in Ithaca, New York during 1970 (•) and the same relationship experimentally induced with dietary DDE (x). From: Lincer (1975).

Case Closed?

"Despite the recent controversy, there can be little doubt now as to the causal relationship between the global contaminant DDE and the observed eggshell thinning and the consequent population declines in several birds of prey."

Jeffrey Lincer, DDT researcher, 2004,
Reason magazine



Pre-DDT Raptor Populations

“[Bald Eagles] ruled the skies when 17th century Europeans arrived in North America . . . But settlers blamed them for killing livestock, so shooting began—and the proud birds’ numbers began to plunge.”

From National Geographic “selections”,
calling Carson’s book a “masterwork”.



DDT and Eagles

- U.S. Congress passed the Bald Eagle Protection Act in 1940, 5 years prior to first use of DDT in N. America!
- Bald Eagles and other raptor bird populations nearly wiped out in late 1800s and early 1900s.
- Hunting, poisoning, bombing, etc.



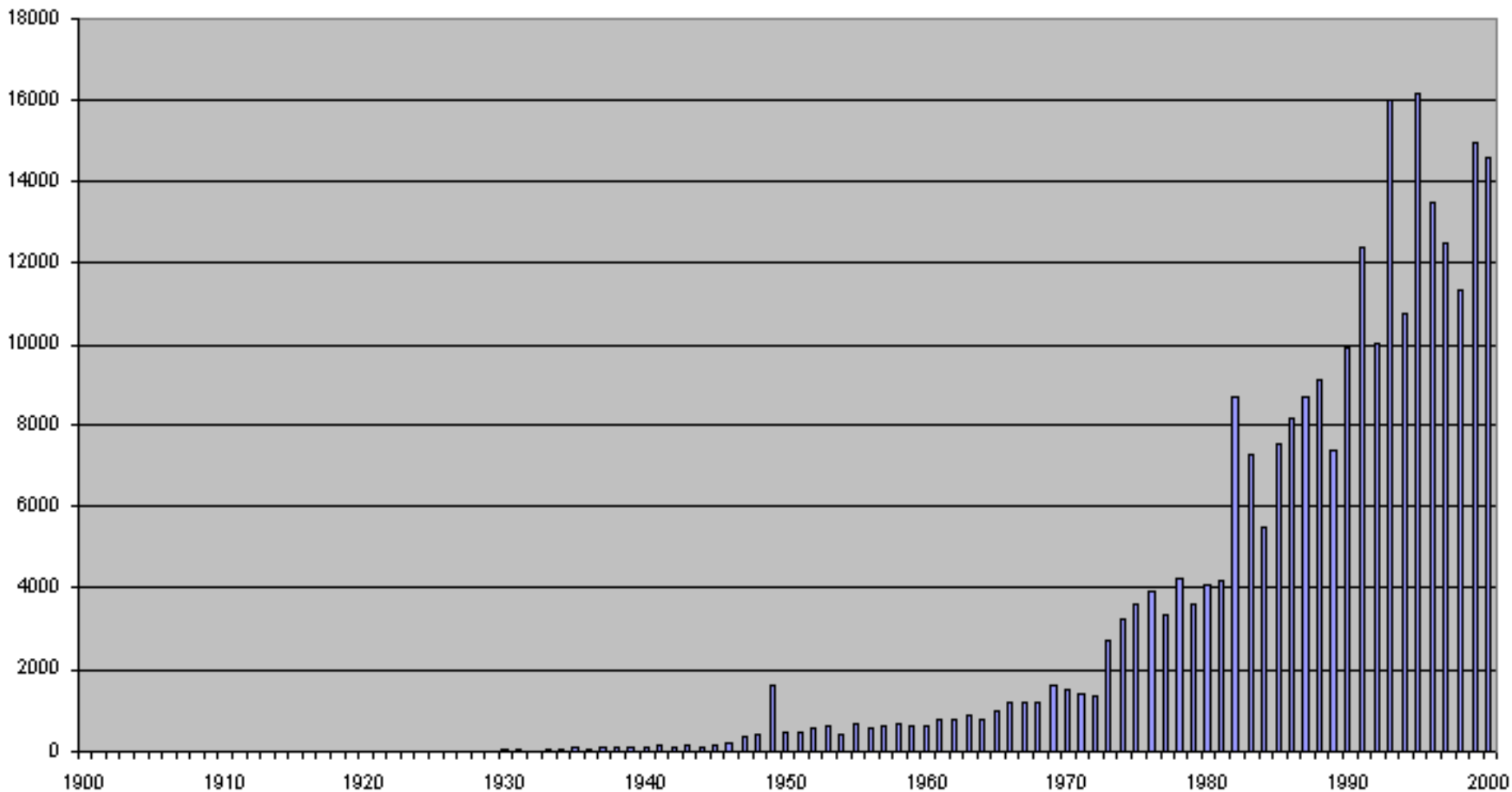
DDT Caused Declines?

- Bald eagles gone from New England in 1937, population drastically reduced in lower 48 states compared to pre-European population.
- 170 Peregrine breeding pairs in entire U.S. in 1940.
- Brown Pelican population estimated at 200 birds in 1941 (down from 5,000 in 1918)

ALL PRE-DDT!



Bald Eagles: Audubon Society Christmas Bird Count 1900-2000



Hawk Mountain Bird Count of Migrating Hawks and Eagles

- 1946 -- 9,291
- 1963 -- 16,163



Pesticides and Frogs

- Mountain yellow legged frog (*Rana muscosa*) in lakes of High Sierra range
- Populations began declining around turn of 20th century.
- Populations absent from much of former range by early 1990s.
- Several theories: UV from ozone hole, parasites, fungal disease, and pesticides



Yellow-legged frogs and pesticides

- Several groups of amphibian researchers proposed possible role for pesticides in mid- and late-1990s.
- Sparling, Fellers, Davidson, Shaffer, etc.
- Based largely on computer modelling of winds and spray drift and on study of tree frogs (abundant in areas where *R. muscosa* wasn't anymore)
- Despite shaky basis, claimed that “pesticides are instrumental in declines”.



Yellow-legged Frogs and Fish

- First evidence that non-native trout were causing population declines in the 1930s.
- Strong evidence for role of stocked trout (dropped by planes in previously inaccessible lakes in late '60s on) as early as 1980s.
- Publications discussing role of trout in late 1990s.
- Dr. Vance Vredenburg research in 2004



Vredenburg Research

- Vredenburg spent 8 years researching in field
- Used gill nets to remove all fish from 5 separate lakes.
- Over three years, Yellow-legged frogs experienced “population explosion.”
- When trout were placed in lakeshore pens, they ate all tadpoles they could reach



“There are at least 10,000 lakes in the High Sierra. Ninety to 95 percent of them hold introduced species of trout but no more frogs at all. And there may be 200 lakes that have plenty of frogs but few or no fish. So the answer is pretty straight forward, and it doesn’t get much simpler: with no trout you get an immediate and dramatic response—the threatened frogs return, . . .”

Dr. Vance Vredenburg, *San Francisco Chronicle*

May 13, 2004

A dark brown silhouette of a mountain range with several peaks, set against a background that transitions from a dark blue gradient at the top to a bright cyan gradient at the bottom.

Deformed Frogs in Minn

- School kids reported large number of deformed frogs and posted to website
- Nationwide deformed frog “epidemic” that gripped US public in late 1990s.
- MPCA launched immediate investigation
- Tested water, tested frogs, surveyed state populations



Minnesota Deformed Frogs

- In 1997, MPCA used FETAX assay w/ African clawed frogs and determined that they'd "found something in the water."
- Held press conference covered by ABC News Nightline with Ted Koppel
- Well water also caused abnormalities in FETAX assay.
- Distributed bottled water to families



Minnesota Deformed Frogs

- FETAX assay repeated by EPA scientists and obtained same result.
- The “problem” was naturally low salt level of Minnesota water and sensitivity of African clawed frogs. False Alarm!
- Stan Sessions at Hartwick College proposed trematode parasites as possible cause of “epidemic”.



Minn Frogs and Parasites

- Dr. Sessions' parasite theory was ridiculed and doubted by majority of amphibian researchers
- Countered that the parasites were rarely found in deformed frogs; couldn't explain the "hot spots"; why wasn't there more evidence of the parasites in historical surveys/collection, etc.



Frogs and Parasites

- We now know that without the parasite, no deformed frogs.
- Parasites are only explanation with solid evidence to support it (parasites clear tissues, cause all types of deformation, etc.)
- Yet researchers still looking for pesticide link via increased parasite susceptibility.



MCPA in Denial

- Despite EPA research, the MCPA researchers published their claims that chemical in water caused deformities in Env. Health Perspectives (coauthor of paper was/is Science Editor at EHP)
- A decade after the MPCA began its investigation it refuses to acknowledge that parasite, not pesticide, is the explanation with the most scientific (evidentiary) basis. Still telling public that chemical is a likely factor.
- That's not science, that's activism.



History of Ecological Science Community

- Leaps to pesticide conclusions (DDT, Mountain Yellow-Legged Frog, trematodes, atrazine?)
- Fails to publicly acknowledge uncertainty and complexity.
- Fails to consider natural explanations



Complex Ecology – Eagle Deaths

- 100 Bald eagles killed over past 10 years at Georgia/SC border – cause was recently determined to be new blue-green algae that produces a neurotoxin.
- Algae consumed by coots, eagles eat coots, eagles die of Avian Vacuolar Myelinopathy, a brain wasting disease.
- Of course, the researchers first considered pesticides, then mercury, then infectious disease BEFORE considering algae toxin.



Consequences of Rash Action

- World told that DDT was horrific ecological threat and MUST be banned.
- Most nations stopped using it in the mid-1970s, including malaria-prone nations that had limited effective alternatives.
- That decision led to the death of 80 million of people in past 30 years, mostly children.



Atrazine Science Still Out

- Atrazine used widely for 40+ years
- Is an important tool for low- and no-till farmers (who have 1/5th soil erosion of organic farmers!).
- Frogs are declining, but the patterns of decline do not correlate very well geographically or temporally with atrazine use.
- Other factors, such as chytrid fungus, killing frogs.
- Considering long use and extremely limited field evidence, banning atrazine now is rash decision.
- There is no grounds to ban atrazine yet.



Atrazine Claims

- Tyrone Hayes claims atrazine “feminizes” frogs and leads frogs that may or may not be able to reproduce.
- Lower atrazine levels cause problems in lab, whereas higher doses do not.
- Using leopard frogs collected in Boston, Massachusetts to assess possible problems in mid-west in other frog species.
- He cannot say if lab results relate to real world population effects



Major Problems with Current Frog Pesticide/Hormone Studies

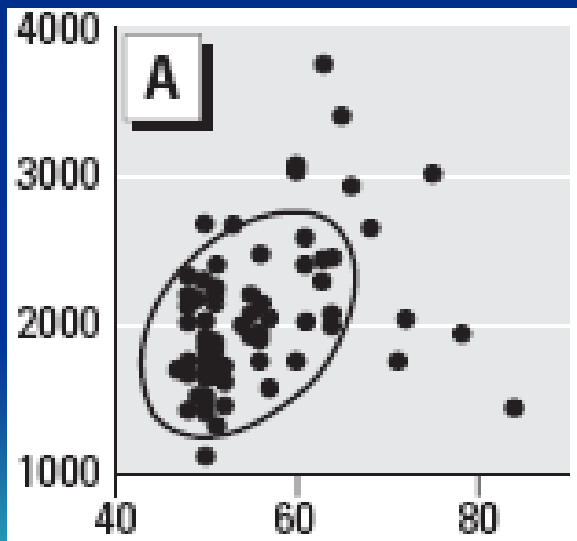
- Frogs cannot reproduce in captivity without injections of hormones
- Hormone injections reverse “feminization of males” claimed by Hayes and others
- No benchmark of past hermaphrodite levels or impact on population or reproductive success



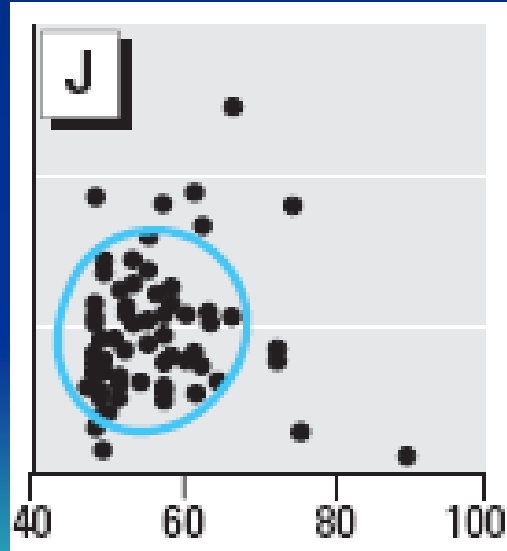
Latest Hayes Claim: Atrazine+8 causes critical 2-3 week delay

Days to complete tail reabsorption
(vertical axis is body weight)

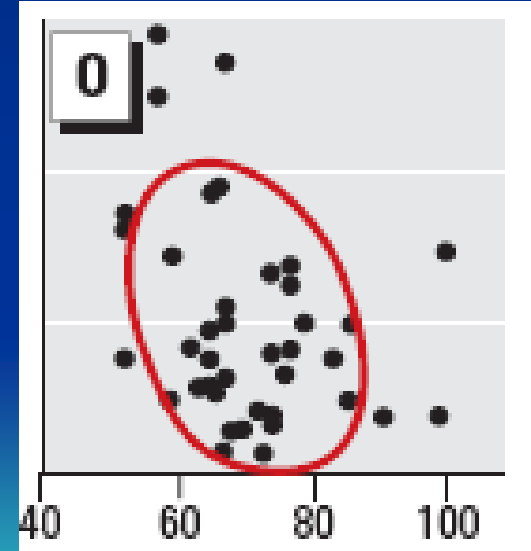
Control ethanol



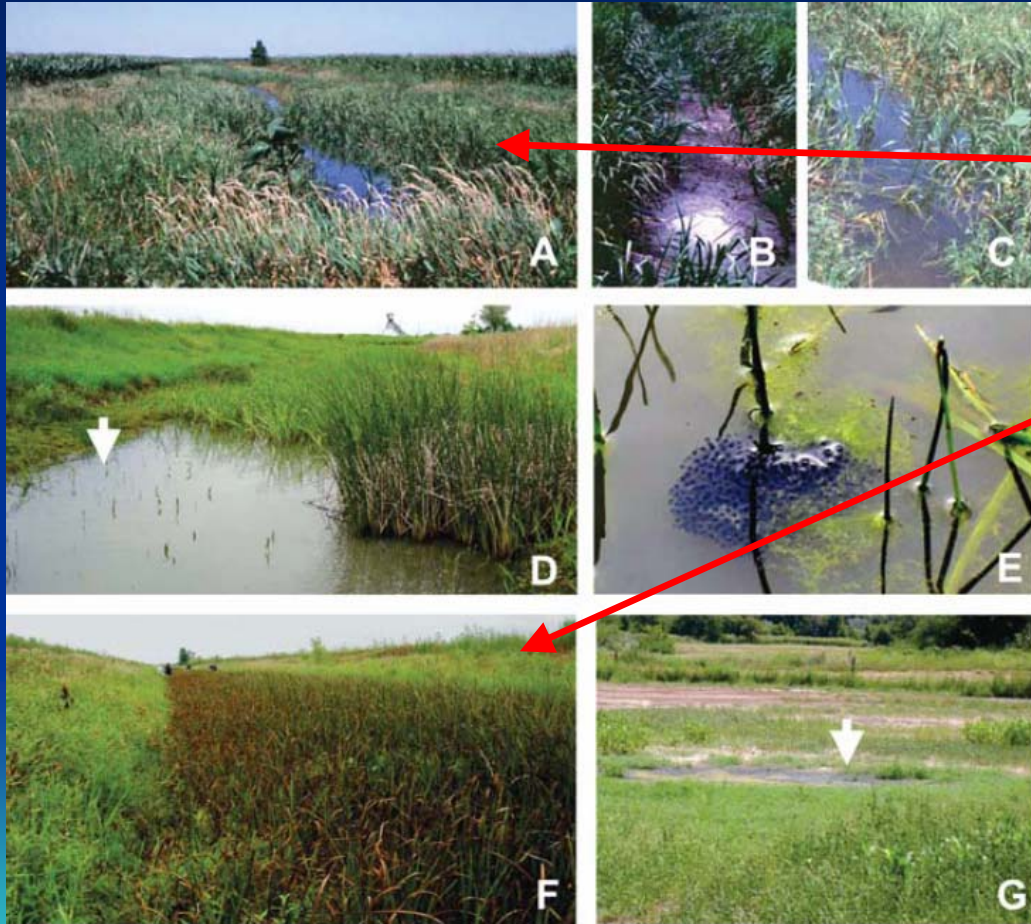
Atrazine 0.1 ppb



Atrazine + 8 mixture



2005 Atrazine + 8 Pesticides



A: Corn field irrigation Ditch with “leopard frogs by the thousands” in 2001

F: “The fields around the irrigation ditch were not planted in 2003 or 2004, and the ditch dried up, resulting in 100% failure of the [frog] population at this site ...”

Atrazine's Purpose: 1937 Coon Creek, Wisconsin





Soil Erosion Present



Farming's Future is a Battle for the Hearts and Minds of Urban Consumers



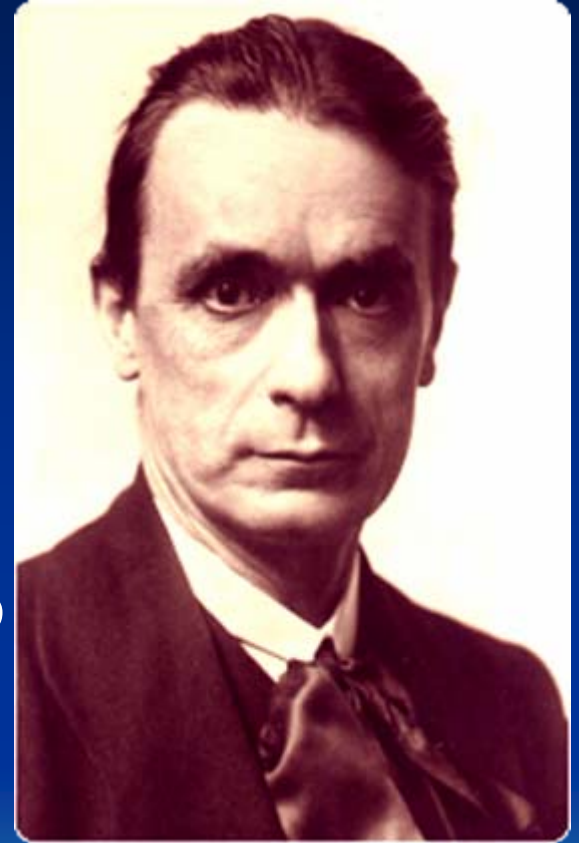
Organic Utopian Myths

- Organic is More Nutritious
- Healthier
- Safer
- Better for the Environment
- More Sustainable



History of Organic Food

- Started in 1920s by German mystic Rudolf Steiner in response to development of synthetic nitrogen fertilizers in 1909
- Lectured on *nutritional deficiency* of “artificially manured” crops in 1924
- Recommended burying manure in cows horns & herbs in stag bladders to “quicken” them with cosmic forces to add to manure fertilizer
- Steiner-food sold under “Biodynamic label



Organic Movement Grows Rapidly

- Entire basis was assumed nutritional benefits
- Lady Eve Balfour (wealthy niece of British Prime Minister) in UK founded Soil Association in 1948
- J. I. Rodale in U.S. founded “Organic Farming and Gardening” magazine in 1942.
- Rodale published *The Organic Front* in 1946 attacking “artificial manure” fertilizer and pesticides – prompting editorial in *The Lancet* in June, 1946 defending safety and nutrition of non-organic foods



No Nutrition Advantage

- Despite >75 years of trying, still unable to demonstrate a SINGLE nutritional benefit!
- Soil Association spent 25 years and \$ millions to prove organic superiority on Lady Balfour's estate. They buried the negative results in 1970s a la Tobacco company.
- Still no sign of nutritional differences (Mader et al. 2006)



Organic Safer?

- Evidence indicates higher likelihood of bacterial contamination (E. coli from recent spinach outbreak traced to low-density, “grass-fed” beef farm)
- Poultry 3X more likely to be contaminated with Campylobacter and Salmonella
- More fungal toxins (cause cancer!)



Organic Pesticide Fearmongering

- “The Organic Center” now claims that OP pesticides less safe than assumed based on NOEL change (saw effects at 1/5 previous dose)
- Yet the reference dose used by the EPA/WHO is 25 parts per trillion, or <800X less the new so-called “worrisome” NOEL
- 1 ppt is = 1 second in 31,000 years!!!!!!



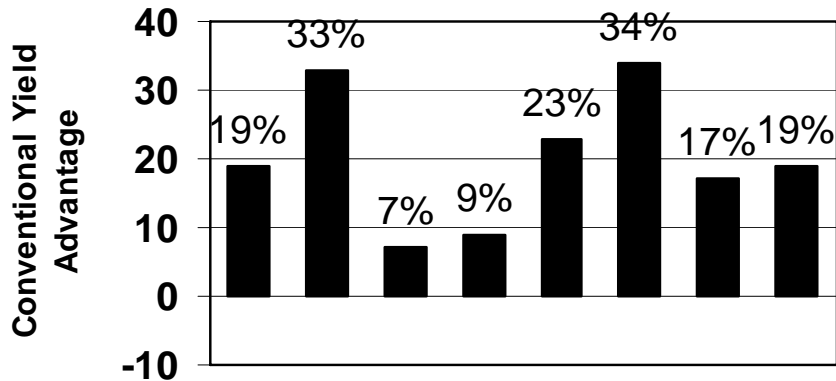
Organic Pesticides

- Less effective yet more expensive
- Applied at higher doses
- Applied more often
- Can be more persistent (copper fungicides)
- Biocontrol = higher cost, not effective, more eco-disruption
- Conclusion = What benefits?

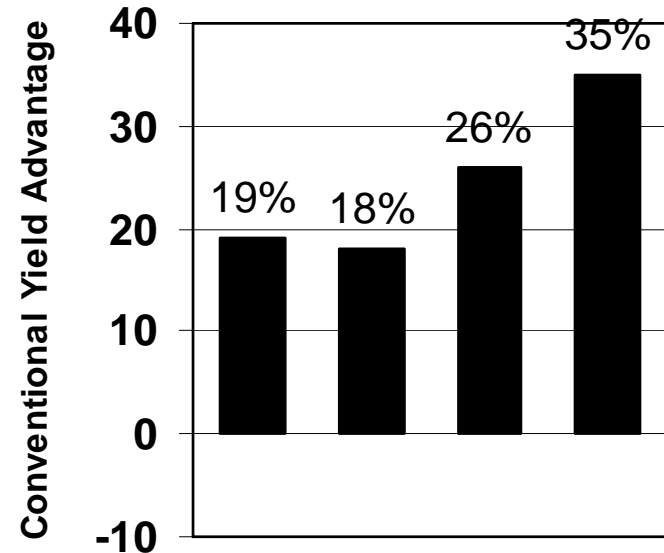


Lower Yields = More Habitat Destruction

Corn: field trials



Wheat



Agricultural Fuel Efficiency

- When environmental activists are demanding increases in the fuel efficiency of our automobiles, why are they advocating **REDUCTIONS** in the input use efficiency of our farming systems?
- No other human activity has a greater impact on environment than agriculture



Organic Unreality

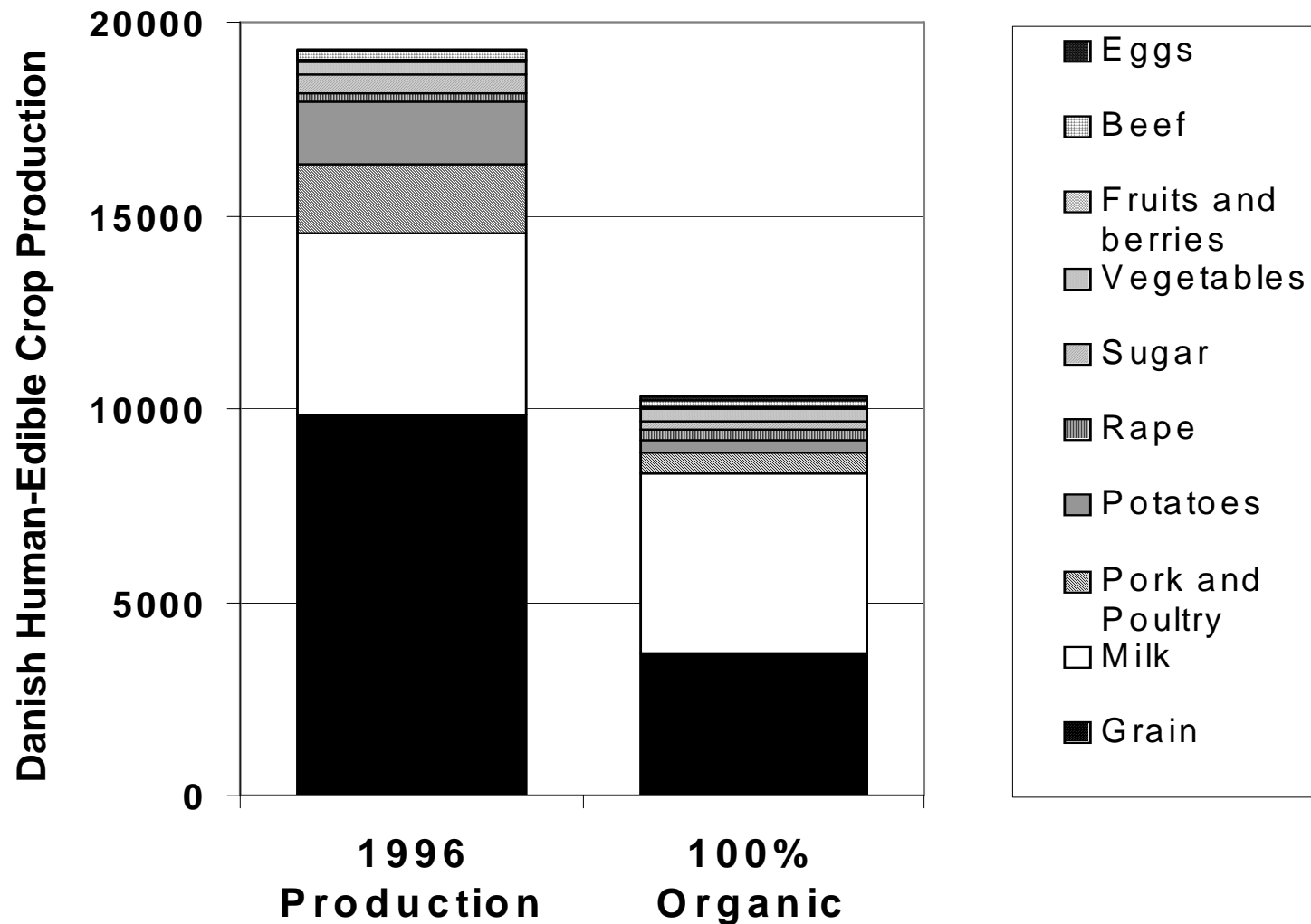
- It would require manure from additional 6-8 BILLION cattle to replace current use of 80 mmt of synthetic Nitrogen fertilizer with organic nitrogen fertilizer!
- Total global cattle population is only 1.2 billion cattle (Vaclav Smil, Univ. of Manitoba, Canada)



Organic Fertilizer = Land



Denmark with 100% Organic

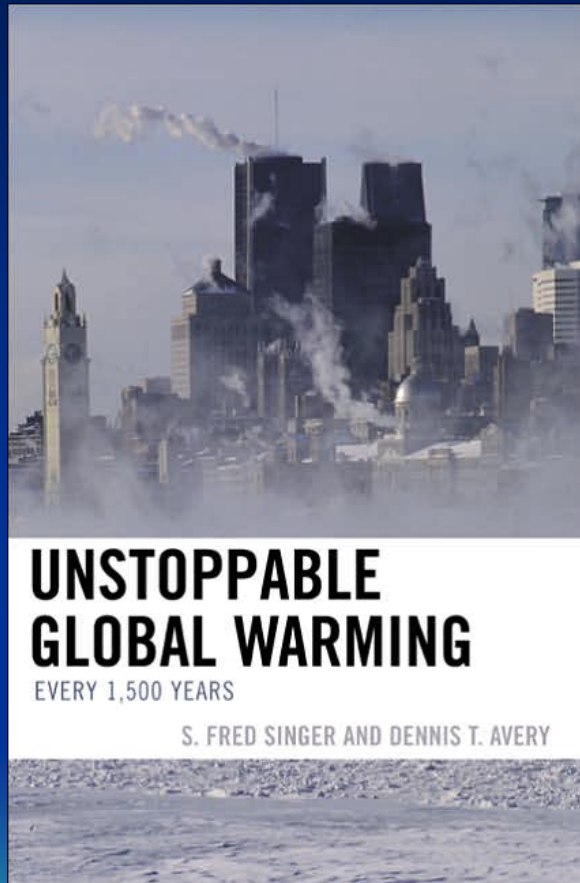


High-Yield Farming

- Greatest Conservation tool.
- If we still achieved yields of 1960, an additional 15-20 million square miles of farmland needed to produce today's food supply.
- Only two ways to meet 21st century food challenge: more land or more food per acre



Global Warming is Natural



New Book by Dennis Avery and Dr. Fred Singer, Rowman & Littlefield, \$20

- Natural climate cycle from solar variation
- Not as warm as 2000 years ago or 1000 years ago
- Brits grew wine in MCO and Roman warming, but only 2 of 10 years today
- Evidence of global cycle, not regional
- Biofuels are a political pay-off to farmers, not conservation tool. All US corn would displace 12% of US transport fuel needs
- Can't stop Mother Nature or sun!

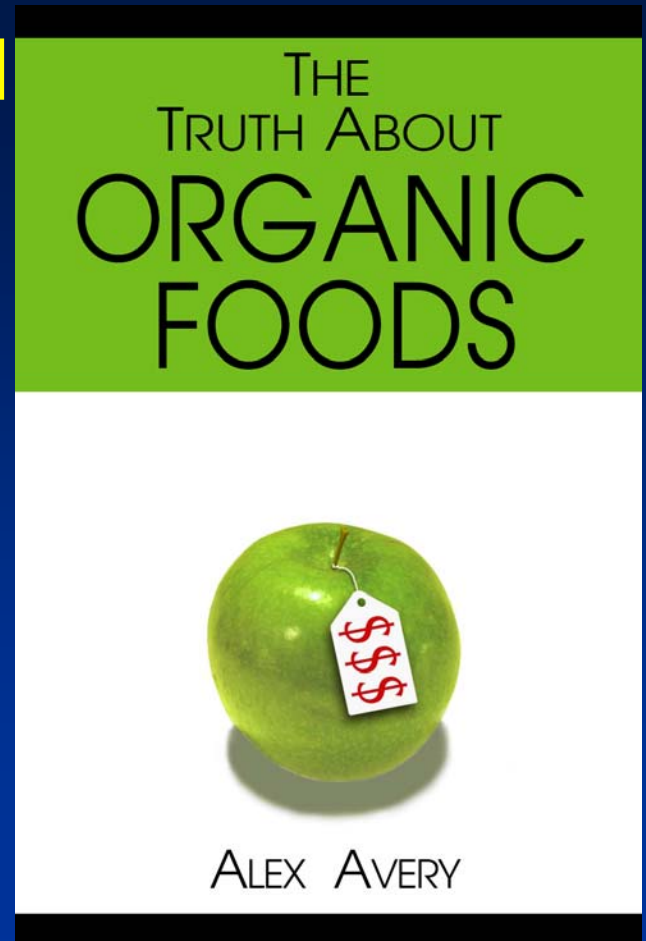
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